ODSA AXI5 Interface Profile

Revision A

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Introduction

AXI5 transfers are encapsulated into TLPs based on the signals on the interface with the SoC on-die interconnect, as defined by AXI Issue G.

The AXI5 Class supports four profiles that is defined by the following:

1. Min Profile
    a. No extensions
    b. 46b Addressing
2. Base Profile
    a. 52b addressing
    b. Extensions: Atomics, Trace, NSIAD, UniqueID, Poison
3. ACE-Lite
    a. Base plus ACE-Lite, MPAM, MTE, MTE, CMO, Read Chunking
4. Extended
    a. ACE-Lite plus Stash, MMU, and DVM

The following extensions are explicitly not supported

- Data Check
- Wakeup Signals
- Trace
- Loopback

This interface profile classifies AXI5 TLPs into one of four TLP streams: A5AWW, A5B, A5AR, and A5R. The four profiles effect each of the TLP stream bit positions and width (granule length).

For AXI5 TLPs, the Aux field in the TLP header grants credits for the various TLP streams:

	4	3	2	1	0
Hubward	Reserved	A5W[0]	A5AR[0]	A5AW[0]	A5CR[0]
Spokeward	Reserved	A5R[0]	Reserved	A5B[0]	A5C[0]

A one in bits 0 through 3 indicates that a credit has been granted for the corresponding stream, while a zero indicates that no credits have been granted. Bit 4 is *reserved* and *must* be zero. Note, the bitfield interpretation depends on the direction of the stream (see below).

An A5CRD TLP is also defined to transmit additional credits for each of the TLP streams.

The AXI5-Lite class effectively connects a requester implemented on one die with a responder implemented on another die. A downstream responder controller transmits the following TLP streams:

- A5B
- A5R
- A5C

An upstream requester controller transmits the following TLP streams:

- A5AW
- A5W
- A5AR
- A5CR

The streams transmitted by one type of controller are received by the other type. Both types transmit and receive A5CRD TLPs (described below).

A5B Stream

The A5B stream consists of B TLP packets, described below.

Extended Profile:

Field	Width	Bits
RESERVED	13	[37:25]
BID	11	[24:14]
BRESP	2	[13:12]
BUSER	8	[11:4]
BTRACE	1	[3:3]
BIDUNQ	1	[2:2]
BTAGMATCH	2	[1:0]

ACE-Lite Profile:

Field	Width	Bits
RESERVED	13	[37:25]
BID	11	[24:14]
BRESP	2	[13:12]
BUSER	8	[11:4]
BTRACE	1	[3:3]
BIDUNQ	1	[2:2]
BTAGMATCH	2	[1:0]

Base Profile:

Field	Width	Bits
RESERVED	15	[37:23]
BID	11	[22:12]
BRESP	2	[11:10]
BUSER	8	[9:2]
BTRACE	1	[1:1]
BIDUNQ	1	[0:0]

Min Profile:

Field	Width	Bits
RESERVED	1	[13:13]
BID	11	[12:2]
BRESP	2	[1:0]

A5R Stream

The A5R stream consists of AR TLP packets, described below.

Extended Profile:

Field	Width	Bits
RESERVED	8	[309:302]
RID	11	[301:291]
RDATA	256	[290:35]
RRESP	2	[34:33]
RLAST	1	[32:32]
RPOISON	4	[31:28]
RTRACE	1	[27:27]
RUSER	8	[26:19]
RIDUNQ	1	[18:18]
RCHUNKV	1	[17:17]
RCHUNKNUM	7	[16:10]
RCHUNKSTRB	2	[9:8]
RTAG	8	[7:0]

ACE-Lite Profile:

Field	Width	Bits
RESERVED	8	[309:302]

RID	11	[301:291]
RDATA	256	[290:35]
RRESP	2	[34:33]
RLAST	1	[32:32]
RPOISON	4	[31:28]
RTRACE	1	[27:27]
RUSER	8	[26:19]
RIDUNQ	1	[18:18]
RCHUNKV	1	[17:17]
RCHUNKNUM	7	[16:10]
RCHUNKSTRB	2	[9:8]
RTAG	8	[7:0]

Base Profile:

Field	Width	Bits
RESERVED	26	[309:284]
RID	11	[283:273]
RDATA	256	[272:17]
RRESP	2	[16:15]
RLAST	1	[14:14]
RPOISON	4	[13:10]
RTRACE	1	[9:9]
RUSER	8	[8:1]
RIDUNQ	1	[0:0]

Min Profile:

Field	Width	Bits
RESERVED	4	[277:274]
RID	11	[273:263]
RDATA	256	[262:7]
RRESP	2	[6:5]
RLAST	1	[4:4]
RPOISON	4	[3:0]

A5C Stream

The A5C stream consists of C TLP packets, described below.

Extended Profile:

Field	Width	Bits
RESERVED	6	[69:64]
ACADDR	52	[63:12]
ACSNOOP	4	[11:8]
ACPROT	3	[7:5]
ACVMIDEXT	4	[4:1]
ACTRACE	1	[0:0]

Not present in the other profiles.

A5W Stream

The A5W stream consists of AW TLP packets, described below.

Extended Profile:

Field	Width	Bits
RESERVED	25	[341:317]
WID	11	[316:306]
WDATA	256	[305:50]
WSTRB	32	[49:18]
WLAST	1	[17:17]
WUSER	8	[16:9]
WPOISON	4	[8:5]
WTRACE	1	[4:4]
WTAG	2	[3:2]
WTAGUPDATE	2	[1:0]

ACE-Lite Profile:

Field	Width	Bits
RESERVED	25	[341:317]
WID	11	[316:306]
WDATA	256	[305:50]
WSTRB	32	[49:18]
WLAST	1	[17:17]
WUSER	8	[16:9]
WPOISON	4	[8:5]
WTRACE	1	[4:4]

WTAG	2	[3:2]
WTAGUPDATE	2	[1:0]

Base Profile:

Field	Width	Bits
RESERVED	1	[309:309]
WID	11	[308:298]
WDATA	256	[297:42]
WSTRB	32	[41:10]
WLAST	1	[9:9]
WUSER	4	[8:5]
WPOISON	4	[4:1]
WTRACE	1	[0:0]

Min Profile:

Field	Width	Bits
RESERVED	6	[309:304]
WID	11	[303:293]
WDATA	256	[292:37]
WSTRB	32	[36:5]
WLAST	1	[4:4]
WUSER	4	[3:0]

A5AW Stream

The A5AW stream consists of W TLP packets, described below.

Extended Profile:

Field	Width	Bits
RESERVED	20	[189:170]
AWID	11	[169:159]
AWADDR	52	[158:107]
AWLEN	8	[106:99]
AWSIZE	3	[98:96]
AWBURST	2	[95:94]
AWPROT	3	[93:91]
AWNSAID	4	[90:87]
AWREGION	4	[86:83]

AWCACHE	4	[82:79]
AWLOCK	1	[78:78]
AWQOS	4	[77:74]
AWUSER	8	[73:66]
AWTRACE	1	[65:65]
AWATOP	6	[64:59]
AWIDUNQ	1	[58:58]
AWDOMAIN	2	[57:56]
AWSNOOP	4	[55:52]
AWMPAM	11	[51:41]
AWCMO	2	[40:39]
AWTAGOP	2	[38:37]
AWSTASHNID	11	[36:26]
AWSTASHNIDEN	1	[25:25]
AWSTASHLPID	5	[24:20]
AWSTASHLPIDEN	1	[19:19]
AWMMUSECSID	1	[18:18]
AWMMUSID	8	[17:10]
AWMMUSSIDV	1	[9:9]
AWMMUSSID	6	[8:3]
AWMMUATST	1	[2:2]
AWMMUFLOW	2	[1:0]

ACE-Lite Profile

Field	**Width**	**Bits**
RESERVED	1	[133:133]
AWID	11	[132:122]
AWADDR	52	[121:70]
AWLEN	8	[69:62]
AWSIZE	3	[61:59]
AWBURST	2	[58:57]
AWPROT	3	[56:54]
AWNSAID	4	[53:50]
AWREGION	4	[49:46]
AWCACHE	4	[45:42]
AWLOCK	1	[41:41]
AWQOS	4	[40:37]

AWUSER	8	[36:29]
AWTRACE	1	[28:28]
AWATOP	6	[27:22]
AWIDUNQ	1	[21:21]
AWDOMAIN	2	[20:19]
AWSNOOP	4	[18:15]
AWMPAM	11	[14:4]
AWCMO	2	[3:2]
AWTAGOP	2	[1:0]

Base Profile:

Field	Width	Bits
RESERVED	22	[133:112]
AWID	11	[111:101]
AWADDR	52	[100:49]
AWLEN	8	[48:41]
AWSIZE	3	[40:38]
AWBURST	2	[37:36]
AWPROT	3	[35:33]
AWNSAID	4	[32:29]
AWREGION	4	[28:25]
AWCACHE	4	[24:21]
AWLOCK	1	[20:20]
AWQOS	4	[19:16]
AWUSER	8	[15:8]
AWTRACE	1	[7:7]
AWATOP	6	[6:1]
AWIDUNQ	1	[0:0]

Min Profile:

Field	Width	Bits
AWID	11	[69:59]
AWADDR	46	[58:13]
AWLEN	8	[12:5]
AWSIZE	3	[4:2]

AWBURST	2	[1:0]

A5AR Stream

The A5AR stream consists of AR TLP packets, described below.

Extended Profile:

Field	Width	Bits
RESERVED	9	[157:149]
ARID	11	[148:138]
ARADDR	52	[137:86]
ARLEN	8	[85:78]
ARSIZE	3	[77:75]
ARBURST	2	[74:73]
ARPROT	3	[72:70]
ARNSAID	4	[69:66]
ARREGION	4	[65:62]
ARCACHE	4	[61:58]
ARLOCK	1	[57:57]
ARQOS	4	[56:53]
ARUSER	12	[52:41]
ARTRACE	1	[40:40]
ARTAGOP	2	[39:38]
ARIDUNQ	1	[37:37]
ARDOMAIN	2	[36:35]
ARSNOOP	4	[34:31]
ARMPAM	11	[30:20]
ARCHUNKEN	1	[19:19]
ARMMUSECSID	1	[18:18]
ARMMUSID	8	[17:10]
ARMMUSSIDV	1	[9:9]
ARMMUSSID	6	[8:3]
ARMMUATST	1	[2:2]
ARMMUFLOW	2	[1:0]

ACE-Lite Profile:

Field	Width	Bits
RESERVED	9	[157:149]
ARID	11	[148:138]

ARADDR	52	[137:86]
ARLEN	8	[85:78]
ARSIZE	3	[77:75]
ARBURST	2	[74:73]
ARPROT	3	[72:70]
ARNSAID	4	[69:66]
ARREGION	4	[65:62]
ARCACHE	4	[61:58]
ARLOCK	1	[57:57]
ARQOS	4	[56:53]
ARUSER	12	[52:41]
ARTRACE	1	[40:40]
ARTAGOP	2	[39:38]
ARIDUNQ	1	[37:37]
ARDOMAIN	2	[36:35]
ARSNOOP	4	[34:31]
ARMPAM	11	[30:20]
ARCHUNKEN	1	[19:19]
ARMMUSECSID	1	[18:18]
ARMMUSID	8	[17:10]
ARMMUSSIDV	1	[9:9]
ARMMUSSID	6	[8:3]
ARMMUATST	1	[2:2]
ARMMUFLOW	2	[1:0]

Base Profile:

Field	**Width**	**Bits**
RESERVED	25	[133:109]
ARID	11	[108:98]
ARADDR	52	[97:46]
ARLEN	8	[45:38]
ARSIZE	3	[37:35]
ARBURST	2	[34:33]
ARPROT	3	[32:30]
ARNSAID	4	[29:26]
ARREGION	4	[25:22]
ARCACHE	4	[21:18]
ARLOCK	1	[17:17]
ARQOS	4	[16:13]
ARUSER	12	[12:1]

ARTRACE	1	[0:0]

Min Profile:

Field	Width	Bits
ARID	11	[69:59]
ARADDR	46	[58:13]
ARLEN	8	[12:5]
ARSIZE	3	[4:2]
ARBURST	2	[1:0]

A5CR Stream

The A5CR stream consists of CR TLP packets, described below.

Extended Profile:

Field	Width	Bits
RESERVED	9	[14:6]
CRRESP	5	[5:1]
CRTRACE	1	[0:0]

Not present in the other profiles.

Miscellaneous TLPs

The AXI5 TLP class defines an A5CRD TLP that combines with the Aux field in the TLP header to grant large numbers of credits for each stream.

TBD